
Radio Spectrum Measurement System (RSMS) Operations

Outputs

- Measurements to determine emission characteristics of a maritime surface search navigation radar.
- Measurements to determine emission characteristics of pulsed frequency hopping signals used in advanced designs of an automotive collision avoidance radar.
- Measurements to verify bandwidth correction factor equations applied to various ultrawideband signals.
- Measurements to determine emission levels of broadband signals transmitted over power lines.

The Radio Spectrum Measurement System (RSMS) and its associated measurement operations are the result of an ongoing commitment of the National Telecommunications and Information Administration (NTIA) to accomplishing four critical spectrum management missions:

1. Measure the extent, patterns, and amounts of radio spectrum usage in the United States (through specialized measurements of individual bands and through broadband spectrum surveys).
2. Measure the radio emission characteristics of individual transmitters to ensure compliance with existing regulations. These transmitters include — but are not limited to — radars, communication links, and navigation transmitters.
3. Measure the electromagnetic compatibility (EMC) characteristics of Government and non-Government transmitters and receivers. These characteristics are used by NTIA's Office of Spectrum Management (OSM) to design band allocation specifications that maximize benefits and minimize future interference problems.
4. Resolve interference problems in cases where a Government radio system may be involved as a victim or interferer.

ITS's RSMS Operations Project is expected to respond to requests for evaluation of these issues through engineering, measurements, and analyses.

In October 2002, ITS used its state-of-the-art spectrum measurement capabilities to measure the spectrum emissions of a maritime surface search navigation radar at the Table Mountain Field Site and Radio Quiet Zone facility north of Boulder, CO. The measurements were performed for two reasons: (1) to determine the rate at which unwanted emission levels varied as a function of measurement bandwidth; and (2) to determine the amount of change that occurred in the shape of the radar spectrum when measurements were performed within the near field limit of the radar antenna. The results were used by NTIA/OSM, presented at the 2003 International Symposium on Advanced Radio Technologies (ISART), presented to the ITU-R Working Party 8B Radar Correspondence Group in London, UK, in June 2003, and will appear in an upcoming NTIA Report on measurement of radar emissions for compliance with the Radar Spectrum Engineering Criteria (RSEC).

In February 2003, NTIA personnel from ITS and OSM worked jointly with the Federal Communications Commission (FCC) and a private sector company to perform measurements on emissions from an advanced design of an automotive collision avoidance radar at the FCC lab at Columbia, MD. The measurements were performed to characterize the radar's spectrum emissions in radio bands that are used by some remote sensing satellites. Results were used by multiple Government agencies to determine the impact that such radar operations might have on some remote sensing satellite operations.

In May 2003, personnel from ITS performed measurements on simulated pulsed frequency hopping signals to further characterize emissions of advanced automotive collision avoidance radars. Results of these measurements were used by NTIA to develop certification measurement procedures to determine compliance with the FCC's emission limits.

Also in May 2003, ITS personnel conducted measurements on various ultrawideband (UWB) modulated signals to verify bandwidth correction factor



RSMS-4 performing measurements of broadband over power line in a residential neighborhood in September 2003 (photograph by B. Bedford).

equations that were the outcome of earlier modeling. The results of these measurements were used by OSM in response to the FCC's requested comments regarding a further notice of proposed rulemaking on UWB.

In June 2003, ITS personnel transported a portable radar spectrum measurement system to a facility in the United Kingdom for a comparative set of measurements on radar spectrum emissions. The measurements, performed near Portsmouth, were made side-by-side with a UK system that had been designed from concepts originated by ITS engineers. The comparative measurements were performed to determine whether two independently designed and constructed measurement systems would show the same spectrum result for the same radar. The results from the two systems (US and UK) were comparable and within the experimental error bounds of the systems.

Starting in August 2003 and continuing into FY 2004, ITS personnel performed measurements to

determine the radio emission levels from broadband over power lines (BPL). This is a new technology that transforms power lines into network cables that can deliver broadband content over unshielded wires. Two field measurements, each lasting approximately 2 weeks, were conducted at different sites (see figure above). The data from these measurements will be used by NTIA in developing a response to a notice of proposed rulemaking issued by the FCC.

In September 2003, ITS personnel performed antenna pattern measurements on a National Weather Service (NWS) radar. The measurements were performed to assist the US Administration with a technical Contribution to ITU-R Working Party 8B, which deals with maritime mobile, aeronautical mobile, and radiodetermination services.

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